between the arteries and capillaries on the one hand, and the veins on the other, as the key-stone of the theory of the causation of sleep. The altered balance of the circulation occasions a change in the balance of active pressure, which is not so much within the brain substance as on the surface. It is less expansive and more compressing, and with this compression consciousness is suspended.

In proof of his theory, the author adduces observations made by Dr. Hughlings Jackson and himself on the retina—the blood-vessels of which are so intimately connected with those of the brain—both during sleep and in a state of coma, from which it would appear that in these conditions the retina was paler, its arteries smaller, but its veins were larger, more tortuous, and distended. In another case recorded by Dr. Kennedy, where a portion of the skull and dura mater had been removed, and the pia mater consequently exposed, it was noticed that the veins in the latter were during sleep congested and assumed a dark hue.

In a concluding chapter, entitled "Some Points in Mental Physiology," which was not contained in his previous work "On the Immediate Cause of Sleep," the author considers how far the peculiarities of the encephalic circulation may affect the functional activity of the different parts of the brain. Starting from the position that the brain is a composite organ, and that distinct portions are put into a state of functional activity in connection with the discharge of their respective duties, the question of balance of the circulation has again to be considered. For the part which is more immediately concerned in the production of the particular cerebral operation must become the seat of vascular excitement, and the amount of blood flowing through its vessels will be greater than that transmitted through the vessels of those other parts of the brain which are for the time being not so functionally active. Hence a certain tension of the area or centre which is actively working must arise, and the encephalic circulation is focussed in the direction of activity. The parts which surround the operating centre would act as a background of resistance, and would afford such support as will secure the immediate liberating action in the discharging centre.

The author applies his views on the encephalic circulation to the explanation of the phenomena of Hypnotism. The first incident in the hypnotic state is a steady prolonged effort of volition in which the attention is concentrated in a very restricted direction. The immediate consequence is fatigue of the nerve-centres concerned in keeping up the strain. Their molecular motions become enfeebled, the circulation through them is less active, and a condition approaching that of sleep is produced. If then, in the form of a "suggestion" from another, some stimulus calls into activity a part of the brain not fatigued in the effort of attention, the vascular activity in it will be increased, and its function will be intensified. An assertion boldly made to a hypnotized person may influence belief in opposition to former experience, and if it be towards an ideational centre, some particular notion may so monopolize the consciousness that discrimination and judgment may become almost as completely in abeyance as in ordinary dreaming.

OUR BOOK SHELF.

Physiography: Elementary Stage. By J. Spencer, B.Sc., F.C.S. (London: Percival and Co., 1891.)

As an introductory science, physiography is one requiring very careful treatment. Its range is undoubtedly wide, but it is correspondingly shallow, and should rather lead up to scientific thought than aim at giving an incoherent collection of facts. In the book before us, the author, who is head master of one of our most successful technical colleges, begins well by recommending that teachers should endeavour to make the subject a practical one, by the performance of experiments, excursions into the neighbouring country, and the collection of specimens of rocks, minerals, and fossils. The experimental shape which the book has consequently taken is one of its most noticeable features; but it certainly falls short of the expectations raised. The chemical and physical parts appear to be excellent, but there is little to assist either teacher or student in gleaning information from the inspection of natural phenomena. A peat bog, for instance, is a fruitful subject for study under proper guidance; but this is not afforded by the scanty remarks on p. 89. In dealing with a wide subject, brevity is essential, but this does not necessitate the omission of the fundamental points, and looseness of expression. The book, however, shows many signs of a want of care in this respect. In the note on Foucault's pendulum (p. 210), for example, the whole point of the explanation is lost by the absence of a reference to the permanence of the plane of swing. On p. 113, it is stated that "submarine volcanoes produce new land, the erupted matter being piled up sufficiently high to form islands"; the omission of the qualifying word "sometimes" might obviously lead to a misconception. Test questions, original and selected, are given at the end of each chapter.

The book is well illustrated, and, with careful revision, should make a useful addition to existing text-books.

Mayhew's Illustrated Horse Doctor. Revised and Improved by James Irvine Lupton, F.R.C.V.S. (London: Griffith, Farran, and Co.)

THE continued existence of domestic medicine, whether the subjects of its application be human beings or domesticated animals, cannot well be doubted. We may, however, be permitted to doubt whether true economy lies in this direction. Nevertheless, as residents in the colonies, and even in many rural districts of our own country, are often far removed from the qualified veterinarian, and considerable time must necessarily elapse before his services when sought can be forthcoming, it is obviously advisable that whatever measures are taken by the stock-owner to ameliorate the sufferings of the animal during this interval of time should be rational, and follow lines similar to those which the professional man would adopt. Wrong methods of procedure would serve only to handicap and hamper his efforts. The book before us can be recommended to guide the horse-owner in such emergencies; though we note with pleasure that the reviser, on p. 553, points out that "the reader will always best consult his interest and pocket by at once consulting a qualified veterinarian." Agreeing with this proposition, we cannot but consider superfluous the introduction of minute directions for the performance of such delicate and difficult operations as the extirpation of the eye-ball, the division of the plantar nerves (neurotomy) in some forms of foot-lameness, and section of contracted tendons (tenotomy). We can scarcely conceive an owner, however intelligent and courageous he may be, proceeding to cast, chloroform, and perform any of the above-mentioned operations.

Horse-owners will do well to note the stress which is laid upon the construction, ventilation, and drainage of

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stables, and the varied information given on the prevention of disease. The reviser has scant sympathy with the use of the actual cautery; but here he is on debatable ground, and, notwithstanding his strictures, we fancy veterinarians will not lightly lay aside an agent which, rightly or wrongly, most of them believe to be potent for good.

The illustrations form the least satisfactory portion of the work. Many of them are grotesque and ludicrous to the last degree, and ought to have been eliminated from the present revised edition. Some, such as those indicative of the symptoms of colic, are good, and well convey their intended meaning. W. F. G.

Handleiding tot de Kennis der Flora van Nederlandsch Indië. Door Dr. J. G. Boerlage. Tweede Deel, "Dicotyledones Gamopetalæ." Eerste Stuk, "Inferæ—Heteromeræ; Caprifoliaceæ—Styracaceæ." (Leyden: E. J. Brill, 1891.)

PREVIOUS parts of this work have been noticed in these columns. It is more than thirty years since the last part of Miquel's "Flora Indiæ Batavæ" appeared, a work written chiefly in Latin; but the present publication cannot be regarded as replacing it, or as being a successor to it. So far as we have tested this "Manual," it is a Dutch translation of the descriptions of the natural orders and genera in Bentham and Hooker's "Genera Plantarum," followed by a list of the species inhabiting the Dutch Indies. Locally it may be serviceable; but what is wanted by botanists generally is a new descriptive elaboration of the species of the region in question. W. B. H.

By Sea-shore, Wood, and Moorland: Peeps at Nature. By Edward Step. (London: S. W. Partridge and Co., 1891.)

THE author of this book, under his pseudonym "James Weston," published in 1886 "Stories and Pictures of Birds, Beasts, and Fishes"; and, two years later, a companion volume, "Stories and Pictures of Animal Life." Both of these volumes, which were very popular, are now out of print. In the present work they have been amalgamated, and the author has added to them some brief "nature-papers" which he has contributed to various periodicals. The book is intended chiefly for young people, and it is so pleasantly written that children who have a chance of reading it can hardly fail to find it attractive. They will obtain from it much interesting information about all sorts of animals, and it will help them to realize that even the most familiar objects, when properly observed, may be worthy of close study. The book is very carefully illustrated.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Note on the Chromosphere Spectrum.

WITH the new spectroscope of the Halsted Observatory, which has a 5-inch Rowland grating of 20,000 lines to the inch, I have repeatedly observed of late that the bright chromosphere line, Angström 6676·9 (No. 2 in my catalogue of chromosphere lines), is not coincident with the corresponding dark line of the solar spectrum, but is *less refrangible* by about one-third of a unit of Rowland's scale. This chromosphere line, therefore, can no longer be ascribed to iron, but must be due to some other substance as yet undetermined.

I think there can be no doubt as to the non-coincidence. The interval between the bright and dark lines varies to some extent with circumstances, being usually less in the chromosphere spectrum on the sun's eastern limb than on the western, and it is often affected by motions in the line of sight; but nine times out of ten the want of coincidence is perfectly obvious.

I may add that I have also obtained a considerable number of photographs of the ultra-violet spectrum of the chromosphere with the new instrument, and get complete confirmation of almost all Mr. Hale's results. I find not only the constant reversal of the H and K lines, but I have obtained, so far, five of the ultra-violet series of hydrogen lines; the first of them being the well-known "companion" of H (first visually observed by myself in 1880), and the other four in their regular succession above it.

The only point in which my plates fail to confirm Mr. Hale's is that I have not yet succeeded in catching the duplicity of the hydrogen α (3889). Several of his plates show at this point two lines near together; none of mine do so, and I conclude that the companion line makes its appearance only rarely. I first observed this line visually in 1883 (*American Journal of Science*, November 1883), and it has since been often seen here by my assistant, Mr. Reed, as well as by myself.

Of course the opinion is no longer tenable that H and K can be due to hydrogen, since the measures clearly show that the companion to H belongs to the hydrogen series. But I am still sceptical whether they are due to calcium, at least in its terrestrial condition. C. A. YOUNG.

Princeton, N.J., U.S., October 20.

Formation of a Temporary Cyst in the Fresh-water Annelid *Æolosoma.*

AS I am not aware that the formation of a temporary chitinous cyst has been described in any Oligochætous Annelid, the following observations may be of some little interest. A few days ago Mr. Latter, science master at the Charterhouse, kindly forwarded to me three tubes containing a quantity of *Æolosoma quaternarium.* They were so abundant that every drop of water contained several specimens; in the water I found also a still larger number of spherical bodies, which proved to be cysts, each completely filled by a single worm coiled once upon itself. The cysts were perfectly colourless and transparent, and very thin-walled; one cyst was found empty, and had been ruptured by the worm in escaping from it. Twenty-six years ago Maggi (*Mem. Soc. Ital. Sci. Nat.*, 1865) described and figured some bodies, oval in form, which he believed to be the cocoons of *Æolosoma;* embryos were found in these cocoons in different stages of development. Prof. Vejdovsky (*Entwickelungsgesch. Unters.*, Heft 1, Prag, 1888) suggested the possibility that these bodies were really cysts; my own examination of what are, I think, undoubtedly cysts in *Æolosoma* leads me to agree with Vejdovsky's suggested interpretation of Maggi's figures. If the structures which I describe here are really cocoons, their form differs from that of the cocoons of all other Oligochæta, in being spherical and without a narrow process at either pole; moreover, it is—on the hypothesis that they are cocoons—a remarkable coincidence that they should *all* contain completely adult worms; finally, and this is of course conclusive, the intestinal tract of the worms contained vegetable detritus. The cysts, as I believe them to be, are of about the size of a *Volvox globator.* In this encysted condition the worms might perhaps be easily transported from place to place; I have found that they survived the evaporation of the surrounding water upon a glass slide for a considerable period; the worms were in continual movement within their cysts, so that it was quite easy to be sure that they were alive. Now this very species has a wide distribution, which may perhaps be partially accounted for by this habit of encystment; with regard to other fresh-water Annelids which have a wide range, such as *Tubifex*, it is possible that birds may inadvertently transport the cocoons from country to country. It is not known yet whether *Æolosoma* forms a cocoon, though it is probable, as the worm develops a clitellum. But sexual maturity appears to be a comparatively rare occurrence in *Æolosoma;* very few observers appear to have seen the sexually mature worms. If this is so, the encystment of the worm may take the place of one of the secondary uses of the cocoon—namely, to aid in the diffusion of the species. FRANK E. BEDDARD.

Polytechnics and Recreation.

IN Mr. Oliver Dawson's article on Polytechnics in your issue of the 8th inst. (vol. xliv., p. 547) he says: "although

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